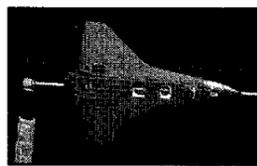


A lot of things went right after last Monday's shutdown of *Columbia's* engines on the launch pad. Story on Page 3.



Engineers in Bldg. 14 are looking for a spot to put a new, higher frequency shuttle antenna. Photo on Page 4.

Space News Roundup

Vol. 32

March 29, 1993

No. 12

Key leadership changes under way

Key leadership assignments in the space shuttle program and the space station redesign effort are going into effect this month at JSC.

Associate Administrator for Space Flight Jeremiah W. Pearson said Leonard Nicholson is leaving his current position as Space Shuttle Program manager to take over the key JSC position of acting director of engineering.

As a result of this action, Brewster Shaw, currently deputy director space shuttle operations will take over the duties formerly performed by Nicholson in the position of director space shuttle operations.

JSC Director Aaron Cohen has assigned current Director of Engineering Henry Pohl to a new position on his staff, where he will be responsible for leading JSC's support of the Agency's effort to redesign the space station. Pohl will spearhead the center's efforts and serve as a focal point for JSC support to Assistant Deputy Administrator Joseph Shea, who was appointed by NASA Administrator Daniel S. Goldin to oversee the redesign.

Shaw will move from Kennedy Space Center to JSC. In addition to his current duties, he will direct the day-to-day management and execu-

tion of the shuttle program, including detailed program planning, scheduling and shuttle systems configuration management.

As acting director of engineering at JSC, Nicholson will be responsible for managing the work of eight functional divisions and providing support to program and project offices for current and future space flight programs assigned to JSC, including the shuttle and space station. JSC's Engineering Directorate also performs complete in-house design, development and testing of certain Government-furnished equipment and maintains expertise

in test facilities and computational complexes.

JSC Flight Crew Operations Director David Leestma has appointed Astronaut Linda Godwin, Ph.D., to replace Col. Loren Shriver as deputy chief of the Astronaut Office. Shriver is being reassigned to the Space Shuttle Program Office to assist in the management of the program. Godwin, who had significant flight operations experience at JSC prior to joining the Astronaut Corps, will assist Chief Astronaut Robert L. Gibson in supervising a corps of 88 astronauts, managing and directing

Please see **TRIO**, Page 4



Shaw

Nicholson



Pohl

Godwin

Work stays on track for other flights

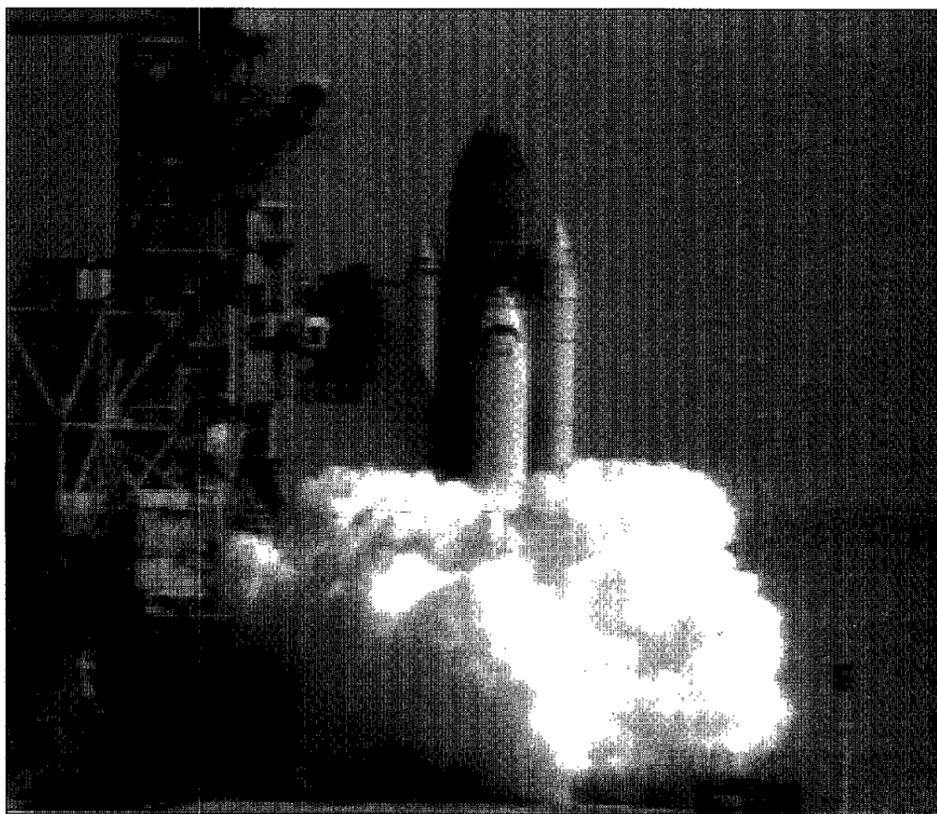
By James Hartsfield

While technicians began removing the suspect check valve in *Columbia's* No. 3 main engine Friday, work elsewhere is keeping *Discovery* and *Endeavour* on track to launches of shuttle missions STS-56 and 57.

At the launch pad, workers continued to safe *Columbia* and began work to remove the heat shield from the main engines. Failure analysis of four check valves—the one suspected of causing the abort plus three similar valves—was to begin during the weekend.

Meanwhile, workers began fueling *Discovery's* orbital propulsion systems at Launch Pad 39B while shuttle managers met Thursday for a final review of *Discovery's* preparations for STS-56. *Discovery* could be ready for launch as early as April 6, although an official target date for any of the three pending flights is not anticipated until the analysis of *Columbia's* check valves is completed and mission priorities have been thoroughly assessed with the shuttle's customers.

In tandem, work on *Endeavour* continues to keep pace in preparation for STS-57. *Endeavour* was rolled out of its processing hangar to the Vehicle Assembly Bldg. to be linked to the STS-57 fuel tank and solid rockets early Wednesday.



NASA Photo

Rocket exhaust billows around *Columbia* on Kennedy Space Center's Launch Pad 39A following an aborted launch attempt last Monday. All three of the shuttle's main engines were shut down just 3 seconds before launch.

Engine shutdown delays *Columbia* in final seconds

By Kelly Humphries

Columbia's engine ignition sequence was shut down by the shuttle's on-board computers at the T-3 second mark last Monday morning, delaying the STS-55 launch for several weeks.

The STS-5 Spacelab D-2 crew remained safe inside the crew compartment as Kennedy Space Center launch controllers immediately began instituting procedures to ensure *Columbia* remained in a safe configuration.

Early reports indicated that main engine No. 3 did not fully ignite because of a liquid oxygen preburner check valve that experienced an internal leak, causing pressure to rise too high in the purge system. *Columbia's* onboard computers sensed the higher than allowed pressure and terminated the ignition sequence.

"Naturally, if I'm honest with you it's a disappointment that we're not flying," STS-55 Commander Steve Nagel said. "On the other hand, I think it's a real testimony first of all to the hardware that it works the way that it's supposed to if a parameter is out of limits that the computers automatically safe the engines and shut them

Please see **ENGINEERS**, Page 4



New main entrance could open as soon as Friday

JSC's new main entrance is expected to partially open to traffic by Friday, weather permitting.

HUBCO Inc., the prime contractor for the \$3.8 million project to widen Saturn Lane and build the new entrance, will open the new public thoroughfare before closing Second Street between NASA Road 1 and Saturn. Once the permanent barriers are installed on

Second, the old JSC main entrance will be for the exclusive use of Space Center Houston visitors.

JSC Gate 2, a little farther east on NASA Road 1, will remain open to provide employees with additional access to the center.

"While there will be some temporary inconvenience to JSC employees, this early opening of Saturn at NASA 1 will accelerate completion

of the entire project," said Center Operations Deputy Director Grady McCright. "Employees are urged to use caution in traveling in and out of the center due to weekly and sometimes daily changes in traffic lane patterns as construction nears completion."

"Drivers probably ought to pay attention to any new street signs because even as they are finishing

it off, situations can change pretty quickly as the contractor completes his work out there," added Security Operations Branch Chief Bob Gaffney.

HUBCO now expects to complete the entire project, which includes an asphalt overlay of Saturn Lane from Bay Area Blvd. to NASA Road 1, by May 23 if weather cooperates.

ATLAS-2 crew 'standing by to stand by'

Quintet to help broaden understanding of Sun's effects on Earth

By Kari Fluegel

The STS-56 crew is "standing by to stand by" and will be ready for its nine-day mission whenever *Discovery's* solid rocket boosters light.

Mission Commander Ken Cameron, Pilot Steve Oswald and Mission Specialists Michael Foale, Ellen Ochoa and Ken Cockrell currently are scheduled to start the Atmospheric Laboratory for Applications and Science-2 mission during the first week of April, but as of press time, shuttle managers had yet to set a firm launch date.

When it is launched, *Discovery* will be carrying ATLAS on its sec-

ond mission to measure the variations in solar output and its effects on the Earth's atmosphere.

Cameron said *Discovery* would launch at night into a 57-degree inclination orbit.

"This will give us the chance to explore the Earth from a different perspective," he said.

Foale added that the night launch and high inclination are necessary to acquire the science for the mission.

"This means that when we get up to the northern latitudes we'll just start to catch the sunrise," Foale said. "During that time as the sun rises, the instruments on ATLAS-2 will be trying to catch the ozone destroying molecules that we think

are present in the northern polar vortex which basically surrounds the North Pole.

"The emphasis of ATLAS-2 is to complement what was done on ATLAS-1 by measuring the atmospheric constituents distributed around the Northern Hemisphere."

The 10-flight ATLAS program is studying the sun's effects on the atmosphere for an entire 11-year solar cycle. The payload's instruments will help calibrate and are similar to instruments currently being flown on the Upper Atmosphere Research Satellite and the European Retrievable Carrier.

"The data we bring back will help

Please see **STS-56**, Page 4



NASA Photo

The STS-56 crew, from left, Pilot Steve Oswald, Mission Specialists Ellen Ochoa and Ken Cockrell, Commander Ken Cameron and Mission Specialist Mike Foale, pauses for a photo at Launch Pad 39B before the terminal countdown demonstration test.

JSC

Ticket Window

The following discount tickets are available for purchase in the Bldg. 11 Exchange Gift Store from 10 a.m.-2 p.m. weekdays. For more information, call x35350 or x30990.

EAA Bluebonnet Trip (April 3 or 18, includes transportation, lunch, tours): \$22, limit 4 tickets per person.

EAA Swan Lake (8 p.m. April 2, 3 p.m. April 3 or 2 p.m. April 4, University of Houston-Clear Lake): \$8.

NASA Night at Astroworld (6 p.m.-midnight, April 2): \$9.95 for first 5,000.

Astroworld Early Bird Special — Tickets purchased before May 31 and used before June 30 at \$15.95.

Fiesta Texas, San Antonio — Discount tickets: adult, \$18.35; child (4-11) \$12.75.

Space Center Houston — Discount tickets: adult, \$7.50; child (3-11) \$4.50; commemorative: \$8.75.

Metro tickets — Passes, books and single tickets available.

Movie discounts — General Cinema, \$4.50; AMC Theater, \$3.75; Loews Theater, \$4.

Entertainment '93 and Gold C coupon books, stamps, Walt Disney Club memberships, business cards, stamps and souvenirs also available.

Upcoming events: Easter Party, April 10; Deep Sea Fishing, April 17; Country and Western Dance, April 24; Galveston Home Tours, May 1, 2, 8 and 9.

JSC

Gilruth Center News

Sign up policy — All classes and athletic activities are first come, first served. Sign up in person at the Gilruth Center and show a badge or EAA membership card. Classes tend to fill up four weeks in advance. For more information, call x30304.

EAA badges — Dependents and spouses may apply for photo identification badges from 6:30-9 p.m. Monday through Friday. Dependents must be between 16 and 23 years old.

Defensive driving — Course is offered from 8 a.m.-4:30 p.m. April 17. Cost is \$19.

Weight Safety — Required course for employees wishing to use the Gilruth weight room is offered from 8-9:30 p.m. April 7. Pre-registration is required; cost is \$5.

Aerobics — High/low-impact classes meet from 5:15-6:15 p.m. Tuesdays and Thursdays. Cost is \$32 for eight weeks.

Exercise — Low-impact class meets from 5:15-6:15 p.m. Mondays and Wednesdays. Cost is \$24 for eight weeks.

Aikido — Martial arts class meets Tuesdays from 6:15-8 p.m. Cost is \$15 per month.

Scuba — Four-week session meets Tuesdays and Thursdays beginning March 25 at the Gilruth Center. Total cost is \$190, with \$50 paid at registration.

Fiction workshop — Five-week creative writing class meets Wednesdays beginning March 31. Cost is \$80.

Self-defense workshop — Learn what you can do to be better prepared at a free self-defense workshop from 5-6 p.m. April 21. Call x30304 to reserve a seat.

Fitness program — Health Related Fitness Program includes medical examination screening, 12-week individually prescribed exercise program. Call Larry Weir, x30301.

JSC

Swap Shop

Swap Shop ads are accepted from current and retired NASA civil service employees and on-site contractor employees. Each ad must be submitted on a separate full-sized, revised JSC Form 1452. Deadline is 5 p.m. every Friday, two weeks before the desired date of publication. Ads may be run only once. Send ads to Roundup Swap Shop, Code AP3, or deliver them to the deposit box outside Rm. 147 in Bldg. 2. No phone or fax ads accepted.

Property

Sale: Dickinson, 4-3-2D, study, game rm, screened porch, lg kitchen w/Jennaire, new ceramic tile, lot w/trees, boat/MH, \$128.9K. Shirley, 335-0641.

Sale: Dickinson Bayou, waterfront, 4-2-5-2, pool, 100 yr old trees, sec sys, FPL, wetbar, dog run, water conditioner, \$224.9K. x34354 or 337-1640.

Rent: Cancun, Mexico, 2 BR condo, full kitchen, sleeps 8, beach front, anytime of year, \$500/wk. x37990 or x33185.

Sale: Pearland, 4-2-5-2, game rm, formals, sunroom, jacuzzi, marble vanities, 6 ceiling fans, \$106K. 480-2771 or 485-7555.

Rent: Colorado, 2 BR, sleeps 5, no pets, no smokers. Bob, x30825 or 998-7372.

Lease/Sale: Friendswood/Wedgewood, 3-2-5-2, lg living rm, patio, trees, fenced, FPL, no pets, \$750/mo or low 70's. 482-6609.

Rent: Galv, beach house, furn, cent air, dly/wkly. Ed Shumilak, x37686 or 326-4795.

Sale: LC, 14 x 70, 3-2 w/lot, new carpet, carport, fenced, \$25K. 943-3842.

Lease: Baywind II condo, 2-2, FPL, fans, W/D, no pets, assigned parking, \$495/mo + \$250 dep, avail April 1. x32168 or 474-7982.

Sale: CL Shores, 3-2-3, 2 story, 80 x 100 lot w/trees, boatslip, \$122.5K. 538-1849.

Sale: Bay Glen FSBO, 3+1-2.5-2A, 2 story, landscaped w/deck, \$121.9K. Brett, 244-4402 or 488-5813.

Sale: Dickinson, 3-1, approx 1000 sq ft, 1/2 acre, \$40K. 337-5018.

Lease: Webster, condo, 2-1, new paint, gray carpet, FPL, all appliances, storage, \$495/mo. x31275 or 486-0315.

Rent: Galv condo, furn, sleeps 6, wknd/wkly/daily. Magdi Yassa, 333-4760 or 486-0788.

Sale: Pipers Meadow, 3-2-2, oversized lot, private patio w/jacuzzi, wooden deck, \$82.5K. 280-0415.

Sale: Sageglen, 4-2-5-2, 2 story, circular staircase, 2 wetbars, block panels, storm windows, solar screens, sec sys, fans, corner lot, extras, \$137.5K. x37760 or 481-4190.

Sale: Mariner Village, power boat slip w/hoist, \$8.5K. 474-4177.

Rent: Arkansas cottage, furn, wooded, 4 acres, screened porch, antiques, \$250/wk, \$50/day. x33005 or 538-4141.

Sale: Pearland/Sun Set Meadows, 3-2-5-

2, study, formals, 2000 sq ft, 2 story brick, 2 yrs old, \$110K. Jim, 482-8800.

Sale: Timber Cover waterfront, 3-2-5-2, 2400 sq ft, boat slip, access to Taylor Lake, CL, Galv Bay, \$175K. 326-1278.

Cars & Trucks

'87 Nissan Pulsar XE, wht, blk int, 5 spd, 73K mi, AM/FM/cass, t-tops, \$4.9K OBO. 244-7117.

'78 Porsche 928, brwn w/leather int, auto, ex cond, 75K mi, \$8.5K. Bill, x48889.

'78 Mercury Cougar, work car or for parts, runs good, \$650. x38976 or 409-925-5230.

'92 Ford Explorer XLT, auto, AC, pwr pkg, 21K mi, \$18K. Steve, x34656.

'80 Toyota Corolla SRS, 5 spd, AC, AM/FM/cass, 100K mi, ex cond, \$2.5K. 488-5601 or 244-8533.

'89 Z24 Cavalier, 27K mi, V6, AC, RD, AM/FM/cass, cruise, tilt, ex cond. 554-2532.

'79 Datsun 280ZX, new paint, 92K mi, \$2.2K. x32458 or 333-9518.

'83 Ford LTD wagon, loaded, rebuilt eng and trans, \$2K OBO. 488-7501.

'84 Pontiac LE6000, wht, new tires, AC needs work, \$1.9K. x36604 or 482-7156.

'89 Plymouth Sundance RS, 2 DR, 44K mi, turbo, sunroof, every option, \$4.9K. 996-9690.

'81 Toyota Celica, AC, pwr brakes, pwr steering, new paint, new tires. 488-4699.

'86 Hyundai Excel, AC, AM/FM/cass, 2 DR hatchback, clean eng, well maintained, nonsmoker, good miles, \$1.2K OBO. 270-5627.

'70 Ford Van, runs, cargo van, \$400. Nelda, 335-2033 or 286-3063.

'83 Nissan Pulsar, wht, 126K mi, good cond, \$1.2K. x37494.

'92 Celica GT or '92 Escort GT, 25K mi, 100K mi warr, take pymts @ JSCFCU, \$169 or \$130 biwly. x37073 or 482-0699.

'77 Chevy PU, auto, air, PS, camper shell, \$1K. 585-3404.

'81 Wolverine 1/2 ton cab over camper, self contained w/ac, bathroom w/shower, sleeps 4, \$1200 OBO. Gordy, 554-7586.

'77 Ford LTD, sell for parts. 286-4184.

'86 Toyota Supra, sunroof, 5 spd, perf pkg, 60K mi, ex cond, \$6.5K OBO. Bob Adams, x32567 or 488-3314.

'90 Ford Escort, 4 DR, hatchback, air, AM/FM/cass, auto, pwr steering, good cond, 43K mi, \$6.5K OBO. Mary Beth, x30439 or 286-7388.

'89 Fleetwood Travel Trlr, 18 ft, sleeps 6, \$6.5K. 489-4304.

'90 Toyota Corolla, 4 DR sedan, auto, AC, PS/PB, AM/FM, new tires, 50K mi, warr, ex cond, \$6.5K. 480-7338.

'78 Volare, 100K mi, good cond, 4 good tires. Lam, x37223 or 280-9880.

Boats & Planes

19' Aristocraft, galv trlr, new eng, 165 hp Merc I/O, ex cond, \$3.5K. 339-1957.

Windwing 6.7 windsurfing sail, good

Today

FEGLI open season — An open season for Federal Employees Group Life Insurance will be held March 29-April 30. Employees may enroll in basic or optional insurance or increase optional coverage. For more information, call Employee Services at x32681.

Cafeteria menu — Special: wieners with baked beans. Entrees: beef chop suey, breaded cutlet with cream gravy, grilled ham steak. Soup: beef and barley. Vegetables: buttered rice, Brussels sprouts, whipped potatoes.

Tuesday

Cafeteria menu — Special: pepper steak. Entrees: fried shrimp, pork chop with applesauce, turkey a la king. Soup: celery. Vegetables: au gratin potatoes, breaded squash, buttered spinach.

Wednesday

Toastmasters meet — The Spaceland Toastmasters Club will meet at 7 a.m. March 31 at the House of Prayer Lutheran Church. For more information, call Jim Morrison at 480-9793.

Astronomy seminar — The JSC Astronomy Seminar will feature an open discussion meeting at noon March 31 in Bldg. 31, Rm. 129. For more information, call Al Jackson at 333-7679.

Cafeteria menu — Special: Mexican dinner. Entrees: fried catfish with hush puppies, braised beef ribs. Soup: seafood gumbo. Vegetables: Spanish rice, ranch beans, buttered peas.

Thursday

Cafeteria menu — Special: hamburger steak with onion gravy. Entrees: corned beef with cabbage and new potatoes, chicken and dumplings, tamales with chili. Soup: split pea. Vegetables: navy beans, buttered cabbage, green beans.

Friday

Cafeteria menu — Special: barbecue link. Entrees: deviled crabs, broiled codfish, liver and onions. Soup: seafood gumbo. Vegetables: buttered corn, green beans, new potatoes.

Monday

Cafeteria menu — Special: chili and macaroni. Entrees: barbecue sliced beef, Parmesan steak, spare rib with kraut. Soup: French onion. Vegetables: ranch beans, English peas, mustard greens.

April 6

Computer Expo '93 — JSC's Information Systems Directorate and the University of Houston-Clear Lake's Research Institute for Computing and Information Systems will host Computer Expo '93 from 8 a.m.-5 p.m. April 6 at the Gilruth Center. More than 40 exhibits and a variety of seminars and demonstrations will be presented free. For more information, call the ISD Products center x37575.

April 7

Lunch and learn — the American Institute of Aeronautics and Astronautics' Automation and Robotics Technical Committee will meet at 11:30 a.m. April 7 in Gilruth Center

Rm. 206. Dr. Reginald Berka, head of the Automation and Robotics Division's Robotic Development Section, will discuss "Control of Hyper-Redundant Manipulators in Space Development." For more information, call Zafar Taqvi at 333-6544.

Toastmasters meet — The Spaceland Toastmasters Club will meet at 7 a.m. April 7 at the House of Prayer Lutheran Church. For more information, call Jim Morrison at 480-9793.

Astronomy seminar — The JSC Astronomy Seminar will feature an open discussion meeting at noon April 7 in Bldg. 31, Rm. 129. For more information, call Al Jackson at 333-7679.

April 8

Future Fest — The Houston Space, Science Fiction, Fantasy, Film and Art Festival will host Houston Future Fest April 8-11 at the Hyatt Regency Downtown. Guests will include science fiction authors Jerry Pournelle and George Alec Effinger. Preregistration is \$20; call Matt Converse at 482-7132.

April 14

Toastmasters meet — The Spaceland Toastmasters Club will meet at 7 a.m. April 14 at the House of Prayer Lutheran Church. For more information, call Jim Morrison at 480-9793.

Astronomy seminar — The JSC Astronomy Seminar will feature an open discussion meeting at noon April 14 in Bldg. 31, Rm. 129. For more information, call Al Jackson at 333-7679.

Musical Instruments

Lg drum set, incl Paiste cymbals, rototoms, hi-hat, seat, \$950. 286-5305.

Ibanez RG 550 elec guitar, hot pink, blk hardware, maple fretboard, Floyd Rose tremol, hard case, strap, \$400. Chuck, 244-7475.

Household

Lg pearl white sofa, \$300. Steve, x34656. Glass/chrome tbl w/6 chairs, ex cond, \$170; Sony CD player, \$50. 337-2784.

Contemp sofa/loveseat, \$325; Cherry wood coffee tbl, \$50; end tbl, \$25; brass lamp, \$25, all for \$400; dinette set, \$225. Donald Thompson, x36852 or 332-8017.

2000 sq ft carpet, lt blue, 2 yr old, ex cond, best offer or will consider donating to good cause. 486-8716.

Kenmore 18.3 cu ft deep chest freezer, ex cond, \$200 OBO; Kenmore lg capacity heavy duty plus dryer, 6 cycles, 5.9 cu ft drum, \$100 OBO. x36190 or 486-4118.

Dishwasher, \$50. Nelda, 335-2033 or 286-3063.

2 swivel rockers, good cond, \$50/ea OBO. 996-6062.

Carpet, cinnamon brown, 150 yds, good cond, \$3/yd. Mark, x38013 or 992-4132.

Kg sz waterbed with H/B; Hummingbird depth finder. x36171.

Dbl Papasan rattan chair w/pillow, good cond, \$100; 19" color tv, stereo, remote, audio needs work, \$100. Anita, x33341 or 559-1761.

Captain chairs, gray, w/arms, skirts, pockets w/pedestals, new cond, both \$350. x36687 or 947-3904.

Qn sz sofa bed, \$300; wood dinette tbl w/3 chairs, colonial, \$50. x33481 or 992-3985.

Country blue print sofa/loveseat, ex cond, \$300. 485-3821.

Sears 15 cu ft chest freezer, \$115. 332-3287.

25" tv, Bell & Howell/Heath in walnut floor model cabinet, built-in alignment/test features w/manuals, \$190. 326-1278.

Wanted

Want used canoe and equipment. Terry, x32264 or 486-9760.

Want small RV or popup to rent from Apr 7 to 21, for camping trip to Georgia. David, x35859 or 486-4870.

Want Apple Macintosh Powerbook 100 computer. Andrew, 280-0647.

Want child's wagon, cond n/a as long as it rolls. Dennis, x31733 or 486-5546.

Want to breed male Eskimo, purple ribbon, AKC, 35 lbs. Jack, 480-8629.

Want child sz sparring gear for karate. Liz, x31543.

Want video cass of Walt Disney's "The Little Mermaid". x38018.

Want two guitarists seeking a drummer and a bassist for hard rock jam sessions. James, 332-1129.

Want to buy "glider rocking chair". 534-3524.

Miscellaneous

Tiffany style hanging lamp, \$50; Johnston & Murphy leather shoes, sz 9N, \$35; alum frame backpack, \$40; 1 adult, 2 childrens life vests, \$20/all. 282-3816 or 486-4517.

Off wht wedding gown, decorated w/pearl beads and sequins, lack back w/pearl buttons, chapel length train, fits sz 6-8, retails at \$900, asking \$400 OBO. Laura, 532-1557 or 335-2388.

Framing supplies, matte board, foam core, samples, etc, \$250. Mike, x40076 or 868-5132.

Radar gun, K10, calibrate speedometers, \$150. 280-8796.

Exercise bike w/digital display; rowing machine, \$150/both. John, 332-6926.

Chevy Astro bucket seats, \$75/pr; Class II hitch w/mounting hardware and receiver, \$75; 7' octagonal hot tub cover, \$100. Wayne, 244-7570.

Murray lawnmower, \$50; Graco infant swing, \$40. 554-2532.

Theatre Under the Stars, center stage tickets, Mar 20, "Brigadoon," May 1, "Sayonara," 2pm Music Hall, \$31/ea. Suzanne, 286-1388 or 335-2896.

Prom dresses, several styles, sz 3-5; southwest style pictures, \$10-\$20. Jo Lynn, 941-4307.

Single waterbed, \$80; 3 spd bike, \$50; crib matt, \$10. Pam, x37171 or 486-1718.

Fischer Price car seat, \$25; Graco padded playpen, \$25. Liz, x31543.

Skaters, join the Suburban Animals, in-line, quad welcome. Mike, x36632 or Keith, x38024.

RCA 19" color tv, remote, good cond, \$80; treadmill, 1 yr home service agreement, \$200. 333-4382.

Bik Astrocraft fiberglass camper top for L.W.B., full sz PU, good cond, \$600 OBO. Adrian, 334-5636.

DP Gym Pack w/free weights, \$150 OBO. 326-3728.

Celestron C90 telescope w/finder, diagonal, eyepiece, Barlow lens, dew shield, carrying case, no mount, \$275 OBO. Dennis, x31733 or 486-5546.

Two rabbit hutches, \$40 and \$80 OBO. 331-2289.

58 gal aquarium, oceanic brand w/stand, pwr heads, heater, Eheim canister filter, undergravel filter, gravel, light, decorations, \$250. Bill, x47476.

Part time kitchen help, Gilruth Center, waitress and dishwashers, evening shift, 4-9:30 pm. Pat, x30326.

Lounge chair, medical type, used for dialysis treatment. E. Rubenstein, x34807 or 532-2211.

Jenny Lind style baby bed, wht w/mattress and pad, \$90; 19" B&W tv, \$20; Ruger N.M. Blackhawk 357 Mag pistol, 4 5/8" barrel, 200th yr commemorative, \$225.1. x34737.

Concept II rowing ergometer rowing machine, displays meters rowed, calories, watts, time, 3 yrs old, ex cond, \$600 OBO. 488-4913.

Grace Under Pressure

Smooth engine shutdown helps alleviate disappointment of last-second launch abort

By Kelly Humphries

While some folks were figuring out exactly what went wrong during last Monday's aborted launch attempt, others were pointing out what went right.

That's because in spite of the disappointment that comes with a last-second abort, the crew remained safe and the vehicle was undamaged. Both will be able to try again in a few weeks after an anticipated changeout of the engines.

"The systems procedures work, the design works, the crew training works and the launch complex in Florida, all of that works," said Hubert J. Brasseaux Sr., chief of Engineering's Systems Branch, who has been working on shuttle systems for 24 years. "All of these procedures have been planned. We don't go into these kinds of situations blind."

"The entire shutdown system, which was conceived 18 years ago, works as it ought to have worked. That's exactly the way NASA builds things," added Ascent Flight Director Wayne Hale.

"I thought the ground guys handled it very professionally, just as the crew did—like they'd done it thousands of times," agreed Flight Crew Operations Deputy Director Steve Hawley.

What happened is that a second and a half into the main engine ignition sequence the right engine's computer controller saw that the pressure in the engine's purge systems was too high. The controller shut down its engine and told *Columbia's* general purpose computers that it had done so. The GPCs in turn shut down the other two engines. Then, the GPCs initiated a critical sequence in which about 10 valves were to be shut or opened one by one, making sure that the volatile liquid hydrogen and oxygen that fuel the engines could not continue to feed any fire that might have developed and that any leftover propellants were flushed out of the main propulsion system plumbing.

All of those automatic shutdown actions taken by the computers, which are making thousands of status checks each second in the final moments before launch, were completed in about 17 seconds, Brasseaux said.

At the same time, ground support personnel and equipment began taking similar steps—spraying thousands of gallons of water on *Columbia's* aft end, checking for propellant leaks and invisible hydrogen fires—and the crew turned to a checklist page and waited for the launch team's calls to carry out those procedures.

It took another 12 minutes to verify that all of the correct valves had been closed or opened and for the crew to run through its checklist, which includes stopping the backup flight software, shutting down the auxiliary power units that control the hydraulically operated engine valves, gimbaling and flight control surfaces, and reconfiguring the flash evaporator system.

Hawley, who went through the first shuttle shutdown on the pad on STS-41D in June 1984, said the STS-55 crew probably didn't have time to be frightened or worried.

"Once you get to main engine start, you hear the noise and you start to feel the rumbling of the shuttle and in our case just as soon as all of that began to register in our brains, we heard the master alarm go off and saw the three red main engine status lights come on," Hawley said. "So we knew we had had a shutdown on the pad. What the crew is trained to do is work some procedures in conjunction with the ground controllers in the Launch Control Center."

"You're not so much concerned for your safety, but you are concerned for how long it will take them to fix the problem so you can try again," he added. "It's like anything else that you train to do, when it happens you do what you're trained to do and you don't really have a lot of time to pon-

ized nitrogen or helium, Brasseaux said. Those gases are used to dry out the lines before liquid hydrogen and oxygen begin flowing so that any atmospheric moisture that has made its way up from the engine nozzles won't freeze. The supercold propellants are allowed to flow through the system before ignition to condition the metal so that everything fits together properly.

"Purges are primarily done during prestart to keep the engine dry so that you don't have any moisture from the atmosphere getting back into the engines and freezing out because all of this is going to get extremely cold and the moisture will freeze really quick because we are putting cold fluids through the engines during prestart. We are conditioning the engines with both liquid hydrogen and liquid oxygen."

"When we go to start, those purges are shut off," Brasseaux explained. The final four-minute-long purge uses helium exclusively pressurized to 750 pounds per square inch. When the purges are shut off, the pressure is expected to return to ambient levels.

When it didn't Monday, the onboard computers knew something was wrong and stopped the launch. The various valve closings begin immediately.

"We want to make sure that if there's engine damage, we don't continue supporting a fire," Brasseaux said. "What we try to do is isolate the engine from the rest of the system. We want to cut off its fuel and oxygen supply. We do that by shutting all the valves that we can."

It's also very important to open some valves, such as the liquid oxygen overboard bleed valve, to prevent damage to the main propulsion system. One scenario involves the formation of a "geyser" in the liquid oxygen lines.

"If those lines get too warm, it could form a gas bubble that would back up the feed line—a 100-foot line that goes back to the bottom of the oxygen tank—and blow all of the liquid oxygen in that line up into the tank. Then that line will refill. When it refills one big water hammer will rupture the line in the vehicle."

In addition to the main propulsion system, the orbital maneuvering system, the reaction control system, the range safety system and the master events controller have to be safed, and the pyrotechnics that have been armed must be disarmed, Hale said. All of those systems worked, just as the millions of parts and hundreds of systems and procedures that were required to get to the last seconds in the countdown had worked.

"Out of all those millions of parts, we had one check valve fail," said Hale. "When you do the statistics, the reliability has to be 99.999 with a bunch more nines. How reliable can you build things?"

"It's still a very complex machine," agreed Hawley. "A lot of things have to come together to get to go fly. From time to time we're going to have problems, but we have the systems to deal with them gracefully." □

'The entire shutdown system, which was conceived 18 years ago, works as it ought to have worked. That's exactly the way NASA builds things.'

—STS-55 Ascent Flight Director Wayne Hale



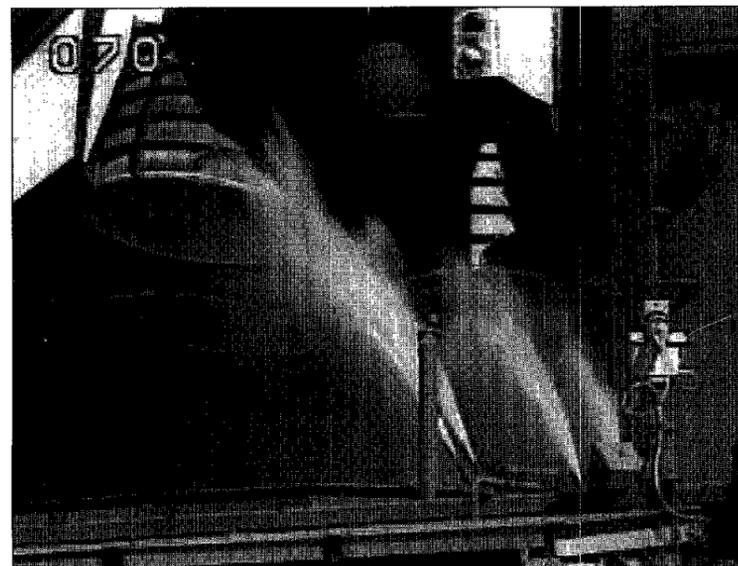
At T-6 seconds, *Columbia's* main engines are given the signal to ignite for the STS-55 launch planned for 8:51 a.m. CST Monday. Main engine No. 3, at right, sputters briefly, while main engines No. 1 and 2 continue to ignite fully. The number in the upper left quadrant of the photo is a camera identifier.



Moments later, main engine No. 3 on the right is shut down by its main engine controller when a higher than allowable pressure reading shows up in a purge line. The controller alerts *Columbia's* general purpose computers that the right engine has been shut down.



The general purpose computers, responding to the main engine No. 3 controller's report of a shutdown, begin shutting down the other two engines in sequence, with the left main engine, No. 2, being shut down before the center main engine, No. 1.



NASA Photos

After all three engines are shut down, safing procedures that include a series of valve closures, leak checks and fire detection checks begin. Thousands of gallons of water are sprayed on the engines to extinguish any fire that may be present.

Trio to assume duties after transition period

(Continued from Page 1)

all Shuttle and Space Station flight crews and providing flight crew engineering support.

"I'm very pleased to make these appointments" Pearson said. "These are extremely talented individuals whose knowledge and experience in space flight make them excellent choices for these key positions."

Nicholson, Shaw and Shriver are expected to assume their new duties after a transition period that is related to the shuttle flight schedule. Pohl will assume his

new duties immediately and Deputy Engineering Director Max Engert will manage day-to-day operations of the organization until Nicholson is free to take over.

Shaw, 47, an Air Force colonel, joined NASA as an astronaut in 1978 and flew three shuttle missions, logging a total of 534 hours in space. He was pilot on STS-9 in 1983, and commander on STS-61B in 1985, and STS-28 in 1989. He was appointed deputy director of NSTS operations at KSC in 1990 and became deputy Space Shuttle

Program manager in 1992.

Nicholson, 54, joined NASA in 1963 as an aerospace engineer in the Manned Spacecraft Center's (now JSC) Spacecraft Integration Branch. He held progressively responsible positions, being appointed deputy director of the Space Shuttle Program in 1989 and director of the Space Shuttle Program in 1991.

Pohl, 60, joined NASA in 1960 as a project engineer at the Marshall Space Flight Center. He transferred to the Manned Spacecraft Center in

1962 to design Apollo attitude control systems and assumed progressively more responsible positions, becoming director of Engineering in 1986.

Shriver, 48, joined NASA in 1978 as an astronaut and flew three shuttle missions, logging a total of 386 hours in space. He was pilot on STS-51C in 1985, and commander on STS-31 in 1990, and STS-46 in 1992. He was appointed deputy chief of the Astronaut Office in 1992.

Godwin, 40, joined NASA in 1980 in JSC's Mission Operations Direc-

torate, where she worked in payload integration and as a flight controller and payload officer on several shuttle missions. She was selected as an astronaut candidate in 1985, and has flown one shuttle mission, STS-37 in 1991. She is scheduled to fly again later this year on STS-59 as payload commander for the Space Radar Laboratory-01 mission.



Shriver

NASA seeks sedentary men for new study

Men who do not exercise regularly are sought as test subjects for a NASA research study on the effects of strength exercise training on the cardiovascular system.

Test subjects must be between the ages of 25 and 50, pass a special physical examination, and be free of cardiovascular, kidney or musculoskeletal disorders. Participants also must be non-smokers, not be taking any medication, have no allergy to iodides and exercise less than once a week, not counting low-level recreational activities such as golf or softball.

Participants will undergo 18 hours of pre-testing during an eight-day period, a 12-week exercising program, and 13 hours of post-testing. Test subjects selected for a control group will not exercise. Both groups will be compensated, but NASA employees cannot be paid.

Volunteers interested in participating should contact Laura Nichols of the JSC Test Subject Facility at x37284 or x37240.

Get ready for some rompin' and stompin'

The JSC Employee Activities Association wants you to put on your western duds and join in the fun for a rompin', stompin' good ol' Country and Western Dance and dinner at the Gilruth Center corral next month.

The Boot Leg Band will play two-steps, western waltzes and polkas for serious dancers, and the Cotton-eyed Joe, Four Corners, Chicken Dance and others for the rest.

For vittles, there will be a buffet bonanza of barbecue beef, chicken and sausage with all the fixin's, as well as dessert.

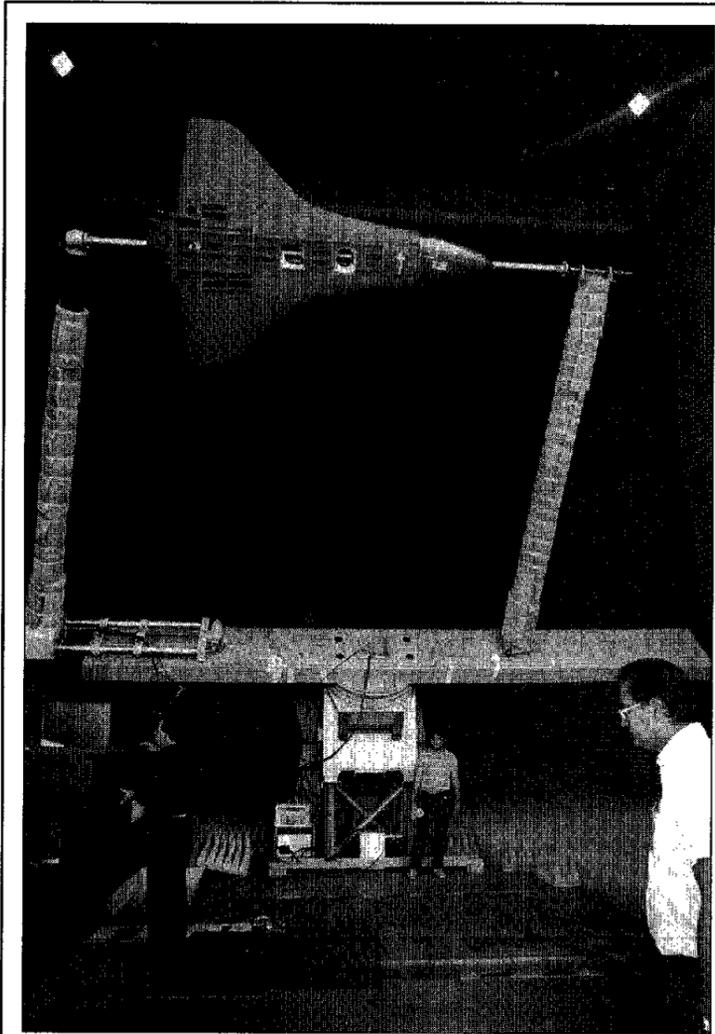
Socializing starts at 7 p.m. April 24, with dinner at 8 p.m. and dancing from 9 p.m. until midnight (or until the cows come home). Tickets are \$15 per person and go on sale in the Bldg. 11 Exchange Store April 7, ending April 21.

For details, call Saverio "Ranger Mike" Gaudiano at x38318.

Computer Expo '93 set for next Tuesday

The Information Systems Directorate's Computer Expo '93, featuring more than 40 exhibits and a variety of seminars and demonstrations, will be April 6 at the Gilruth Center.

The exposition, to be open from 8 a.m. to 5 p.m., is sponsored by ISD and the University of Houston-Clear Lake's Research Institute for Computing and Information Systems. For more information, call the ISD Products Center at x37575.



FINDING THE RIGHT SPOT—Lockheed employees Larry Johnson, Romeo Sanchez and Larry Dolson, from left, set up a one-tenth scale space shuttle mockup in the Bldg. 14 Antenna and Tracking Development Laboratory's anechoic chamber in preparation for an antenna pattern test. Antenna Subsystem Manager Al Steiner said his team is looking for a location on the shuttle for a new higher frequency UHF antenna that will get shuttle transmissions out of military frequency bands.

JSC Photo by Andrew patnesky

Contract worth \$422 million

Johnson Engineering wins man-systems support contract

JSC, through a competitive process, has selected Johnson Engineering Corp. of Houston to begin contract negotiations for the Man-Systems Support Services contract.

The MSSS contract, valued at about \$422 million, will continue the support currently provided to the JSC Flight Crew Support Division by JSC and Lockheed Engineering Sciences Co. of Houston, a major subcontractor to JEC.

The contractor will provide personnel, materials and services to support research, development, engineering, fabrication and facility operations associated with flight

crew hardware development and provisioning, crew integration and human factors, and mockup and trainer support.

The MSSS effort was acquired through a 100-percent small business set-aside competition with a mandatory requirement to award a minimum of 8 percent of the total dollars to small disadvantaged businesses. The procurement will be awarded as a cost-plus-award-fee, level-of-effort contract.

The initial period of performance will be five years beginning May 1, with three and on-year options for a total performance period of nine years. Space station efforts will be set out as options.

GE Government Services wins science payloads pact

JSC, through a competitive process, has selected GE Government Services of Houston to begin final contract negotiations for the Science Payloads Development, Engineering and Operations Contract.

The work to be provided includes support for dedicated life sciences mission, the biomedical monitoring and countermeasures project, small and rapid response payloads, the crew health care system and

the cosmic dust collection facility.

Total proposed cost and fee of the nine-year effort beginning May 1 is about \$480 million. The performance period will be divided into a five-year base contract period and a pair of two-year option periods. The space station effort will be set out as options. The award will be the continuation of the engineering and scientific effort currently being performed by GE Government Services.

Engineers want to be sure valve problem isn't generic

(Continued from page 1)

down. Secondly, I'd like to take this opportunity to pay tribute to the launch team, who did a superb professional job."

Nagel said he was convinced the launch would take place until he saw the three red engine indicators light in sequence—engine 3, engine 2 and engine 1—as they shut down. There was no panic when the abort occurred, he said.

On the flight deck with Nagel were Pilot Tom Henricks and Mission Specialists Charlie Precourt and Bernard Harris. Payload Commander Jerry Ross and German Payload Specialists Ulrich Walter and Hans Schlegel were on the middeck.

"The predominant reaction was just disappointment," Nagel said. "I assured everybody, especially those on the middeck who can't really see what's going on, I assured them that everything is OK and just sit tight and we're probably going to have a

normal, orderly egress at some time later, which we did."

Shuttle Program Manager Leonard Nicholson said the abort does not compromise the outstanding record of the shuttle team over the past few years and that he does not think it will cause any major disruption of the flight schedule.

"We're going to have these kinds of problems occasionally in a system as complex as this one," Nicholson said. "We will recover from this in a very professional and safe manner and proceed on with meeting our commitments for this year."

D-2 Program Manager Heinz Stoewer said his countrymen, who have been watching preparations for the German Spacelab flight with great interest, are disappointed but understand that what counts are safety and good scientific results.

"I hope that we can get back in a launch position soon, but I hope even more that when we are ready

to launch and the darned thing lifts off then this is going to be a very, very safe mission," Stoewer said.

Technicians will enter the Space-lab module while *Columbia* is on the pad to replace samples, perform maintenance and "make sure everything stays sharp and fresh," Stoewer said.

"What did work, and work very well, was the safety system," said Launch Director Bob Sieck. "The on-board computers sensed the overpressure in this line, shut down the engines in a safe, orderly fashion and the launch team executed their safing procedures, which are a combination of hardware, software and manual calls in a flawless fashion. As a result, the crew is safe and the vehicle is on the pad and it's safe, also. We'll find and fix the problem and get on with flying D-2, it's just going to be down the road a little bit."

Marshall Space Flight Center's Shuttle Project Manager Alex

McCool said engineers believe the failure was in the oxidizer system check valve but that an exact determination wouldn't be possible until the valve is removed and failure analysis is performed. He said the suspected check valve passed tests in the fall of 1992.

"We want to look and see what is the problem before we go to some different engines and understand if it's generic," McCool said. "We don't believe it's generic, but we want to look at it."

Launch had been scheduled for 8:51 a.m. CST, and Monday's countdown had been smooth and weather conditions acceptable for launch.

The shutdown was the third in shuttle history, with the first occurring on STS-41D on June 26, 1984. That mission launched Aug. 30, 1984. A second engine shutdown on the pad occurred July 12, 1985, delaying the STS-51F mission. That flight launched on July 29, 1985.

STS-56 crew to deploy, retrieve SPARTAN carrier

(Continued from page 1)

to correct for the degradation of these similar instruments on UARS and EURECA," Ochoa said.

In addition to their work with ATLAS-2, STS-56 crew members will deploy and retrieve the SPARTAN carrier with the Ultraviolet Coronagraph Spectrometer and the White Light Coronagraph to investigate the conditions of the solar corona.

The UCS and WLC have flown previously on sounding rockets, obtaining four to five minutes of data for each flight. The SPARTAN will give the instruments about 40 hours of data collection time.

"That is real exciting for the scientists since it's difficult to get this information from the ground," Ochoa said.

Oswald said the satellite will be

deployed on Flight Day 3 with the rendezvous and retrieval occurring on Flight Day 5.

Other payloads, most of which have flown before, include the Shuttle Solar Backscatter Ultraviolet, Solar Ultraviolet Experiment, the Commercial Materials Dispersion Apparatus Instrumentation Technology Associates Experiment, the Physiological and Anatomical

Experiment, Space Tissue Loss, Shuttle Amateur Radio Experiment, HERCULES, and the Cosmic Ray Effects and Activation Monitor.

The five-member crew will work in two shifts for 24-hour payload operations with Oswald and Ochoa on the Blue Team and Foale and Cockrell on the Red Team. Cameron will adjust his hours as mission activities warrant.

Space News Roundup

The Roundup is an official publication of the National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Texas, and is published every Friday by the Public Affairs Office for all space center employees.

Editor Kelly Humphries
Associate Editor Karli Fluegel